

CLAIMS

We claim:

1. A high pressure chamber for processing of a semiconductor substrate comprising:
- a. a chamber housing comprising a first sealing surface;
  - b. a platen comprising a region for holding the semiconductor substrate and a second sealing surface; and
  - c. a mechanical drive mechanism coupling the platen to the chamber housing such that in operation the mechanical drive mechanism separates the platen from the chamber housing for loading of the semiconductor substrate and further such that in operation the mechanical drive mechanism causes the second sealing surface of the platen and the first sealing surface of the chamber housing to form a high pressure processing chamber around the semiconductor substrate.
2. The high pressure chamber of claim 1 wherein the first sealing surface of the chamber housing comprises an o-ring groove.
3. The high pressure chamber of claim 2 further comprising an o-ring within the o-ring groove.
4. The high pressure chamber of claim 1 wherein the second sealing surface of the platen comprises an o-ring groove.
5. The high pressure chamber of claim 4 further comprising an o-ring within the o-ring groove.
6. The high pressure chamber of claim 1 wherein the first sealing surface of the chamber housing seals to a spacer and further wherein the second sealing surface of the platen seals to the spacer.

- 1           7.           The high pressure chamber of claim 1 wherein the mechanical drive  
2           mechanism comprises a piston driven by a fluid.
- 1           8.           The high pressure chamber of claim 7 wherein the fluid comprises an  
2           incompressible fluid.
- 1           9.           The high pressure chamber of claim 7 wherein the fluid comprises a  
2           compressible fluid.
- 1           10.          The high pressure chamber of claim 1 wherein the mechanical drive  
2           mechanism comprises an electro-mechanical drive mechanism.
- 1           11.          The high pressure chamber of claim 10 the electro-mechanical drive  
2           mechanism comprises a linear actuator.
- 1           12.          The high pressure chamber of claim 11 wherein the linear actuator  
2           comprises a drive screw.
- 1           13.          The high pressure chamber of claim 1 further comprising a mechanical  
2           clamp coupled to the chamber housing and the platen such that in operation the  
3           mechanical clamp maintains the high pressure processing chamber during  
4           processing.
- 1           14.          A high pressure chamber for processing of a semiconductor substrate  
2           comprising:  
3           a.           a chamber housing;  
4           b.           a platen comprising a region for holding the semiconductor  
5           substrate;  
6           c.           a mechanical drive mechanism coupling the platen to the chamber  
7           housing such that in operation the mechanical drive mechanism separates  
8           the platen from the chamber housing for loading of the semiconductor  
9           substrate; and

d. means for sealing coupled to the chamber housing such that in operation the mechanical drive mechanism causes the means for sealing, the platen, and the chamber housing to form a high pressure processing chamber around the semiconductor substrate.

15. An apparatus for high pressure processing of a semiconductor substrate comprising:

- a. a pressure chamber frame;
- b. a piston coupled to the pressure chamber frame and comprising a piston body and a piston neck, the pressure chamber frame and the piston body forming a first fluid cavity;
- c. a sealing plate coupled to the pressure chamber frame, the sealing plate in conjunction with the pressure chamber frame, the piston body, and the piston neck forming a second fluid cavity;
- d. a platen coupled to the piston neck, the platen comprising a region for holding the semiconductor substrate and a first sealing surface; and
- e. a top lid coupled to the pressure chamber frame and comprising a second sealing surface, the first sealing surface of the platen and the second sealing surface of the top lid configured such that in operation the first and second sealing surfaces form a high pressure processing chamber.

16. The apparatus of claim 15 wherein in operation the high pressure processing chamber operates at supercritical conditions.

17. The apparatus of claim 15 wherein in operation the high pressure processing chamber operates below supercritical conditions.